WQ - 1 – Irrigation Water Quality Sampling

Why Sample: Effects of Poor Water Quality on Soils

Irrigation water quality refers to the kind and amount of salts present in the water and their effects on crop growth and development. Soil samples as well as water quality samples must be taken to determine the quality. If levels of calcium, magnesium, and sodium, as well as chlorides, sulfates, and bicarbonates, as a group or alone, are too high, crop growth can be hurt. High levels can even cause crop failure. Often it is associated with poor soil structure.

Crop growth reductions because of dissolved substances in the soil are similar to drought-stressed effects. An osmotic gradient on salty soils is formed. Water uptake by plant roots is increasingly restricted as the concentration of soil salts increases. Because of this, as soil salts build up in the soil, more frequent irrigation is necessary to help flush out salts and reduce water stress.

A breakdown of soil structure is a major effect of elevated sodium. Soil aggregates are bonded by calcium and magnesium. High levels of dissolved sodium tend to displace these bonding elements and disperse the aggregates. As sodium increases, dispersion increases and soil tilth declines. Soil dispersion caused by sodium can make soils run together, crust easier, and can limit water infiltration.

How to Take Irrigation Water Quality Samples

Levels and specific makeup of dissolved substances in irrigation water affect crop productivity and soil structure. They also determine if water is suitable for irrigation.

Water analyses can only be as accurate as the sample taken. Contact your laboratory first to obtain the form and any specific procedures to follow. Follow these simple guidelines when collecting a water sample:

Containers and Handling

Sample early in the week to avoid having the sample sit in a lab over the weekend. Samples should be collected in a new clean, plastic bottle (at least a pint) with a screw cap. Rinse the plastic bottle and cap 3 times with the water you wish to sample to eliminate any contamination. Fill the bottle to the top and cap tightly. Wipe the bottle dry. Clearly identify each container with a simple sample identification which matches the request form for the laboratory. Tape the bottle shut so that it doesn't leak. When mailing, place bottles in a box and pack with a loose, soft packing material to prevent crushing. Avoid glass containers, as boron concentrations may change and glass has higher potential for breakage. Some samples may require overnight delivery. If the sample can't be sent immediately, refrigerate it before sending to the laboratory. Keep good records of the date and location of each sample. This can best be done by keeping a copy of the laboratory information sheet that must be submitted with each sample.

Well Water

Let the pump operate twenty minutes to an hour before taking the sample to be sure the water is representative of what is being tested. Take the sample from water at the pump so that residues from the lines do not contaminate the sample. If two or more wells supply an irrigation system, one sample may be taken from the system after pumping (flushing) for at least one hour. However, if a water test indicates a problem, all wells supplying the system will need to be tested individually to determine the source of the problem. Sometimes one poor quality well can dramatically reduce the quality of a mixture.

Other Water Sources

Testing should also be done on irrigation water from ponds, reservoirs, streams, canals, or other surface water sources. Samples can be obtained by collecting water from a faucet near the pumping station after operating for twenty minutes or longer. For irrigation water sources where no pump is present, obtain samples by attaching a clean bottle to a pole or extension and collecting and mixing several samples into a "composite" which is sent to the laboratory. Samples from lakes, streams, or ponds should be taken below the surface for a representative sample. Where sprinkler or pivot irrigated, fill the bottle directly from the sprinkler or point of emission.

What Analyses to Request

In most cases, a routine irrigation water analysis is the most appropriate test to request for irrigation water. Regardless of laboratory selected, be certain that the analysis includes the three major factors – total soluble salts, sodium hazard (SAR) and individual potentially toxic ions. The most recommended analyses to request are:

Ammonia (for nitrogen loading)
Carbonates
pH
R_{adj}
Bicarbonates
Chlorides
Phosphorus
Sodium
Boron
Magnesium
Potassium
Sulfate
Calcium
Nitrate nitrogen
Salinity
Total nitrogen
Electrical Conductivity
(for nitrogen loading)
SAR
(for nitrogen loading)
Fluoride
Total dissolved solids

Special Analyses Processing -
For microbiological analysis see instructions for specific lab.

Water Quality and Subsurface Drip Irrigation systems:

The irrigation water to be used in a drip system should be evaluated carefully to assess any potential clogging problems. Materials suspended in the water, such as sand, silt, and algae, can block emitter flow passages or settle out in the drip lines. Other contaminants, such as calcium, bicarbonate, iron, manganese, and sulfide, can also precipitate to clog emitter flow passages. All water needs to be tested to determine levels of dissolved salts, pH, and turbidity (sediment levels). Growers need to be aware of high levels of pH (7.5) and high dissolved bicarbonate levels (=> 5.6 meq/liter). If water quality analysis indicates these levels, sulfuric acid and/or gypsum should be injected to acidify the water to lower the pH to prevent the emitters from clogging with precipitates. A pH of 6.5 is favorable for injecting fertilizers or other agricultural chemicals into the system.

NM Certified Laboratories for Drinking Water Analyses – Can be Used for Irrigation

Albuquerque Water Quality	*	Albuquerque, NM	(505) 873 6249
Assaigai Aanlytical Laboratories	* +	Albuquerque, NM	(505) 345 8964
City of Carlsbad	*	Carlsbad, NM	(505) 887 1191
Diagnostic & Technology Center, Inc.	*	Alamogordo, NM	(505) 434 4944
Indepth Water Testing	*	Santa Fe, NM	(505) 471 2023
City of Farmington Env. Lab	*	Farmington, NM	(505) 599 1373
Gallup Micro Biology Lab	*	Gallup, NM	(505) 863 2001
Hall Environmental Analysis	+	Albuquerque	(505)345 3975
City of Hobbs	*	Hobbs, NM	(505) 397 9315
International Lubrication & Fuel Consultants, Inc.	*	Rio Rancho, NM	(505) 892 1666
Kramer & Associates, Inc	*	Albquerque, NM	(505) 881 0243
City of Las Vegas	*	Las Vegas, NM	(505) 454 1533
Micro Biology Lab	*	Milan, NM	(505) 287 2208
NM American Water Co.	*	Clovis, NM	(505) 763 5538
NM Water Testing Lab, Inc	*	Espanola, NM	(505) 753 6028
OMI Inc	*	Farmington, NM	(505) 325 6953
Pinnacle	+	Albuquerque	(505) 344 3777
Raton Water Works	*	Raton, NM	(505) 445 3861
Town of Red River	*	Red River, NM	(505) 754 6671
Scientific Labaratory Division/DOH	* +	Albquerque, NM	(505) 841 2510
City of Silver City	*	Silver City, NM	(505) 538 3731
SWAT Lab	* +	Las Cruces, NM	(505) 646 4422
Triangle Laboratories	dioxin	Research Triangle Park, NC	(919) 544 5729
City of Tucumcari	*	Tucumcari, NM	(505)461-4372
* for microbiology + for chemicals		Source: http://www.nmenv.state.nm.us/dwb/certified_labs.html	Updated 9/27/06